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ABSTRACT

The relative development of Piagetian concrete logical operational abilities was investigated in Mexican American and Anglo American children. Performance was assessed on eight classification tasks and three forms of transitivity, measuring seriation skills. One phase of the study compared the performances of 30 Anglo and 30 Mexican American students from a lower-middle class school, grades K-3. Ethnic background, age, grade, and sex were not found to be effective predictors of the measured abilities. Verbal ability was the best single predictor of classification task performance. Another sample of younger students from a middle class school scored at a higher level than the total group, indicating socioeconomic status to be an important factor. (Author/MV)

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A COMPARISON OF ANGLO-AMERICAN AND MEXICAN-AMERICAN STUDENT PERFORMANCES ON MEASURES OF CLASSIFICATION AND TRANSITIVITY

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Piaget, in his theory concerning the cognitive development of the individual, has posited intellectual development as being a special form of biological activity. Intellectual capabilities grow both quantitatively and qualitatively as the child matures. The child's potential for higher-order intellectual functioning increases with his physiological advances, however, actual cognitive growth is dependent on interaction with the environment. Piaget has summarized this growth in a sequence of cognitive stages. While these stages are thought to differ qualitatively, development is considered to progress cumulatively; each new step in development is integrated with, and is developed from, the abilities gained in previous steps or stages. Piaget views the order of appearance of the stages as being fixed, however, the age at which particular individuals attain any one stage typically exhibits variations. Such variations are considered the result of individual differences in neural development and environmental interaction. The present study was concerned with factors influencing development of abilities associated with Piaget's third stage of development, the period of concrete operations. It is during this time that the child's cognitive activities become organized into coherent and integrated systems. Skills developed during this time include conservation, seriation and classification. Seriation and classification abilities were of particular interest here since they are considered to be the two main classes of concrete logical operations and have not been studied extensively.

Factors Influencing the Rate of Development.

In addition to maturational factors, many researchers have investigated the role of environmental factors on the development of concrete operations. Both social transmission, primarily of a linguistic or educational nature, and direct experience are considered to affect the child's intellectual growth. The research has generally involved cross cultural comparisons involving children from countries and cultures around the world, as well as social class comparisons within particular groups. While diverse studies such as these have been conducted,

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there are few researchers who have investigated development of these abilities in Mexican-American children. In view of the continuing controversy over relative cognitive capabilities and educational attainments, such investigations appear to be needed. Since environmental variables have been associated with variations in the appearance of concrete operations abilities, this study was conducted to assess the development of classification and seritation (as measured by transitivity tasks) in samples of Mexican-American and Anglo-American children from both middle and low income groups. The question asked was whether or not existing cultural differences, including language, do, in fact, affect cognitive growth.

Stendler (in Fry and Haugen, 1969) has suggested that the child's experience as well as the social transmission of linguistic and educational factors may influence the rate of his intellectual growth. Hunt (1961) attempted to explain the effects of social and environmental factors on intellectual development. Hunt believes that cognitive growth can occur only when there is a "match" between the internal operation and the external environment. If the problems posed by the environment are too difficult, assimilation will not take place. Instead of mental growth (Piaget's adaptation), frustration and withdrawal will result. On the other hand, if the problems presented by the environment are too easy, boredom and disinterest will occur. The belief that cognitive development may be affected by environmental factors, including those of a social or cultural nature has been at least partially supported by past research. A study by Wadsworth (1971) found social class to affect performance on conservation tasks among American kindergarten students. Greenfield, cited in Bruner (1966), found that tasks involving classification were positively affected by the degree of assimilation of Western culture among an Alaskan Eskimo population. Braine (1959) also found differences in the rate of development of concrete operations between American and Canadian children.

The research concerning the effects of formal education on concrete operational ability has produced mixed results. Mermelstein and Shulman (1967) in their study of Negro children from Prince Edward County, Virginia, found no significant differences on Piagetian tasks which could be attributed to differences in education. However, Goodnow and Bethon (1966) found that although lack of schooling did not upset the ability to conserve weight, volume, or surface, it did upset combinational reasoning tasks. The researchers concluded that education helps the child to do "work in his head"; i.e., he has less need for manipulation or sensory perception in working tasks. Baker (1973) also found a relationship between education and the ability to complete certain Piagetian tasks. She evaluated the effectiveness of both a public nursery school program and a Title I program by comparing middle and low SES subjects.

Baker found that the students who had attended nursery school showed greater ability to conserve continuous quantity than those who had not attended nursery school. There were no differences between the comparison groups in their ability to conserve number or weight.

Another area of research has been directed towards the effect of socio-economic factors on the development of cognitive abilities. One such study Baker and Sullivan (1970) indicated that middle SES girls showed higher conservation ability than did lower SES girls of the same age and intelligence. Soares and Soares (1973) administered a series of Piagetian tasks, including one of conservation, to a group of 60 kindergarten children composed of approximately equal numbers of Blacks, Puerto-Ricans, and Anglo-Americans. Results of testing indicated that the Anglo group performed better on the conservation tasks than the disadvantaged group. The results were interpreted to mean that the Anglo group, who came from middle and upper SES homes, and who had received more extensive and varied experiences than their less advantaged counterparts, were therefore less egocentric in their perceptions.

Lloyd (1971) administered tasks assessing both conservation of number and continuous quantity to 80 Yoruba children ages 3.5 to eight years. Equal numbers of boys and girls from both traditional and elite homes were studied. The parents of the "elite" children had completed at least a secondary school education, while parents of the "traditional" children had received little or no formal education. The "elite" families had an overall higher standard of living, and typically provided more educational opportunities for their children. Testing was performed by female Yoruba examiners using both familiar and alien materials. Results of the testing indicated that conservation performance was a linear function of chronological age and that the subjects from elite homes outperformed those from traditional homes at all age levels. The over-all performance of "elite" Yoruba subjects was also found to be as good or better than that reported for American subjects. The type of test materials used had no apparent effect on performance, and suggests that conventional western materials are acceptable for use with non-western cultures.

One of the few studies involving Mexican-American subjects was carried out by Swize (1971) in a multivariable study. He explored the relationship between the criterion variable of conservation and the predictor variables of ethnic background, SES, and primary language used in the home. Other predictor variables used in this study were CA, MA, IQ, sex, academic achievement and educational

background. The sample of 70 subjects consisted of 33 males and 37 females. Thirty-four children were of Mexican-American families. Swize did not find either ethnic background or sex to be a significant predictor of conservation performance. Of the nine predictor variables tested, only socio-economic level and primary language used in the home yielded significant and positive ($p. < .05$) contributions to the prediction of the criterion.

The majority of the studies cited involved tasks of conservation with little attention given to classification or seriation tasks. The relative lack of interest in the development of classification and seriation skills seems unfortunate in view of Piaget's and Inhelder's (1964) belief that they represent the two main classes of concrete logical operations. To Piaget (Inhelder & Piaget, 1964) logic implies the ability to compare and catagorize objects. The logical individual shows flexibility in his anticipation of possible alternative relationships between objects and in his ability to restructure previous classifications according to new criteria. Lovell, Mitchell and Everett (1962) have also discussed the use of classification and seriation tasks in assessing intelligence. Such widely used tests as the Wechsler Intelligence Scales, the Columbia Mental Maturity Scale, and the Illinois Test of Psycholinguistic Abilities, all contain what may be considered classification and/or seriation tasks. The widespread assessment of such skills appears to constitute a de facto acknowledgment of their relevance, and makes the lack of research on such operations seem all the more critical.

Although, as has been already noted, most researchers have used only conservation tasks in their studies of cross-cultural behavior; some studies have been done using either classification or seriation tasks. As one example, Price-Williams (1962) in an often-cited study, used 80 high SES Primary School students of the Tiv tribe of Nigeria and 60 lower SES children of the same tribe who had

never attended school. The children were divided into age groups of 6.5 years, 8 years, 9½ years, and 11 years. Subjects (Ss) were then presented with a group of local animals or plants and asked to show which member of the group was different from the others. The Ss were also asked to explain their judgments and all testing was performed in the child's own language. Price-Williams found no significant differences between literates and illiterates at all age levels. He also noted that their classification development was somewhat below the norms given by Piaget for European subjects.

deLacey (1970) administered a series of classification tasks to four samples of Australian children, (a) Aboriginal children living in rural areas (N=86); (b) Aboriginal children living in European areas (N=89); (c) European children of low SES; (d) European children of high SES. The tasks were modeled on those used by Piaget and Inhelder and included tests of hierarchical classification and a test of multiple-classification similiar to Raven's Progressive Matrices. Aboriginal children living in European areas were found to perform better than Aboriginal children having fewer contacts with European culture. High SES European children were found to perform at a higher level than the low SES Europeans. deLacey also found that the high contact Aboriginals performed at the same level as the low SES Europeans, a result which he felt, was due to the similarity in their envrionments. Over-all, he felt that his results lend support to the belief that the degree of enrichment of the environment influences a child's ability to classify.

Sharan and Weller (1971) attempted to compare the classification performances of children from both the lower and middle classes of Western and Middle Eastern societies. Their sample consisted of 357 Jewish children in the first grade of school. Fathers of lower-class children were unskilled laborers while the middle-class fathers were either white collar workers or professionals. The parents of the Middle Eastern children were all born in Yemen, Iraq, or Iran, while parents of the Western group were all born in Poland. Classification was

measured by a series of sorting tasks, involving 12 common items, all of which varied according to use, color, material and form (such as wood blocks, a cigarette, metal can opener, and a plastic cup). Lower class children were found to give more non-grouping responses than did middle class children, while Middle-East children produced more nonscorable responses than did Western Children. The authors concluded that these results are indicative of the inability of lower class children to successfully encompass all of the objects under one class label, although they did attempt to meet the demands of the task. Middle Eastern children, however, were unable to deal with even the fundamental requirements of grouping. Lower class children were found to rely more frequently on color as a determinant of grouping and seemed less able to employ more abstract criteria than did middle class children. Overall, both the lower class and Middle Eastern children seemed less able to organize the objects into appropriate conceptual groupings when compared with the middle class and Western children, a result reflecting both social class and ethnic differences.

Although most of the previously cited studies have attempted to compare Western socities with non-Western cultures, Wei, Lavatelli, and Jones (1971) confined their study to one of social class differences in American society. Eighty white grade school students were identified as either middle class or culturally deprived on the basis of their parents occupation, educational level and the location of their homes. The four Piagetian classification tasks used in this study were those of changing criteria, classification of real objects, class inclusion and multiple classification. The results of this study indicated that the low SES children performed at a less advanced level compared with middle class children at both kindergarten and second grade levels. Overall, the low SES children seemed to possess limited criteria for classification and experienced difficulty in abstract reasoning.

Zimiles and Asch (1973) tested the idea that differences in classification skills previously observed between American middle and lower socio-economic classes would also be found between advantaged and disadvantaged children in Mexico. They presented a non-verbal classification test of 44 items to 254 children in Mexico City. The children were selected in equal numbers from the first three grades in two different elementary schools. One school, located in a fashionable part of the city, was attended by children whose fathers were professionals or semi-professionals. In general, the families of these "advantaged" students had a standard of living comparable to that of a lower-middle class family in the United States. The second school was located in an impoverished area and was attended mostly by the "disadvantaged" children of factory workers or migrant laborers. Test results revealed consistent differences in performances between the social groups, with the advantaged group almost invariably superior. These results were than compared with those obtained for a group of "advantaged" children in New York City. A comparison of the Mexican and American results indicated that the criterion differences between social classes in Mexico City were smaller than those found in New York. In addition, both New York groups out-performed their Mexican counterparts, with a rank order of performance: the New York City advantaged, the New York City disadvantaged, the Mexico City advantaged, and the Mexico City disadvantaged. The authors concluded that Mexican society is more homogenous in its experiences, resulting in smaller differences in functioning between their social groups.

Research Using Mexican American Subjects

The studies that have been performed, although using populations of children as diverse as those of middle-class Americans and Australian Aborigines, have seldom investigated the performance of Mexican-American subjects. More studies to include Mexican-American subjects seem warranted in view of the continuing controversy over relative cognitive capabilities and educational attainments.

As early as 1928, Garretson found Mexican-American students to be at least 10.53 months behind their Anglo-American classmates in school grade placement and also to obtain lower scores on standardized IQ tests at all age levels. Jensen (1961) has administered tests of immediate recall, serial learning, and paried-associate learning together with conventional intelligence tests to both Mexican-American and Anglo-American school children. As a result of this testing he concluded:

> ...the low IQ Mexican-American children have not acquired in their environment the kinds of knowledge, habits, and skills, that provide the basis for school learning and which are tapped by IQ tests. (p. 157)

Such a view is generally consistent with Piagetian theory.

Previous attempts to compare the cognitive abilities of Mexican-Americans and Anglo-Americans have been criticized because of possible effects of confounding variables on the test results. Variables that have been mentioned include language differences, examiner bias and inadequate norm group representation (Cervantes, 1974; Pasamanick, 1951; and Sanchez, 1934). One possible solution to the criticisms leveled at conventional assessment techniques has been suggested by Piaget and Inhelder (1947). They believe that most of the problems encountered with conventional intelligence tests stem from their artificial, somewhat arbitrary nature which is not directly related to the underlying stages of cognitive development. They suggest the use of Piagetian tasks, which by their very nature are intended to measure underlying cognitive development and not social artifacts. They stated:

> Problems of conservation therefore show in evidence the operation of intelligence, independently from chances due to verbal and mnesic attainments, or in particular school drill. (p. 404)

Statement of the Problem

The purpose of this study was to assess the development of classification and seriation skills in a sample of Mexican-American and Anglo-American children from the same low SES environment. Both judgment and explanation responses on

Piagetian tasks of classification and seriation (as measured by transitivity tasks) were used to assess the presence of cognitive ability. The second portion of the study compared the performance of this total sample of low SES children to a sample of middle SES children from another location.

Assuming that the culture of Mexican-American children is different from that of Anglo-American children, and that these differences are critical to development in the Piagetian scheme, then differences in cognitive development may be expected because of ethnic associated environmental differences. Such differences may be manifested in group scores on Piagetian classification and seriation tasks.

The compariosn of these children to children from a middle SES area should help to further understand the nature of the variables which influence the development of the cognitive abilities tested.

Method

Sixty children, ranging in age from 67 to 115 months (mean age 87.7 month, S.D. = 15.3) were selected for the first portion of this study. The group consisted of 30 Anglo and 30 Mexican-American, with equal numbers of males and females in each ethnic group. These children represented five classrooms in a predominantly lower-middle class elementary school in School District 6, Greeley, Colorado. Students were selected from each of the grades of kindergarten through third grade (mean grade level = 1.3 years, S.D. = 1.2) with the selection being based on the number of Anglo-American students available in each classroom. The distribution of subjects according to sex and ethnic background in each grade is shown in Table 1.

TABLE 1

Grade Level Distribution of Subjects
by Sex and Ethnic Group

		Kinder-garten	First Grade	Second Grade	Third Grade
Anglo-American	Males	5	4	2	4
	Females	6	4	3	2
	Total	11	8	5	6
Mexican-American	Males	5	4	1	5
	Females	6	3	3	3
	Total	11	7	4	8

Attempts were made to select equal numbers of Anglo-Americans and Mexican-Americans from each classroom in order to hold teaching effects constant.

The children were tested during regular school days in the spring of 1975. All testing was performed under supervision and administered by female Mexican-American examiners. Verbal ability was assessed by results on the Peabody Picture Vocabulary Test (PPVT) administered by the examiners prior to their administering the Piagetian tasks. Since some researchers have hypothesized that the cognitive abilities of minority children may be 'masked' by their poorer verbal abilities the PPVT was chosen because it requires no verbal response and might, therefore, be more suitable for use with bi-lingual children. The scores obtained on the PPVT were used as a predictor variable in order to assess the effects of possible differences in verbal ability between the subject groups on task performance.

Sixty first-grade childre, ranging in age from 75 to 94 months (mean age = 81.9, S.D. = 4.4) were selected for the second part of this study. These children represented eleven classrooms in three comparable middle-class elementary schools in Tempe, Arizona. These children were originally selected as part of an independent research project, however the testing materials and procedures used were

the same. The second group was tested in the spring by graduate students who were proficient in testing skills.

Description of the Instruments

The eight classification tasks used in this study were previously used by Zellner (1974). Seven of these tasks were adapted from Kofsky (1966) with the eighth task, that of additive composition of classes, being adopted from a study by Piaget and Inhelder (1969). The tasks measured were: conservation of class, multiple class membership, horizontal reclassification, hierarchical reclassification, the whole is the sum of its parts, conservation of heirarchy; class inclusion and the additive compostion of classes.

Seriation ability was indirectly measured by tasks of transitivity. Items investigating transitivity length, weight, and discontinuous quantity were adapted by Zellner from Smedslund (1964). Both judgments and verbal explanations were recorded and evaluated to assess performance in a manner similar to that used in the Goldschmidt and Bentler Concept Attainment Test.

Results

Data describing the comparison groups in the first portion appear in Table 2, together with the mean scores on the Peabody Picture Vocabulary Test, and the criterion tasks of classification and transitivity.

TABLE 2

Means and Standard Deviations for Predictor and Criterion VAriables

Ethnic Group	Sex	Predicator: Age (months)	Grade	Verbal Ability	Criterion: Classification	Transitivity
Anglo-American	Male					
	Mean	89.5	1.3	62.5	18.9	3.1
	S.D.	16.7	1.2	10.4	6.2	1.2
	Female					
	Mean	86.7	1.1	56.9	16.4	2.8
	S.D.	14.6	1.1	7.9	7.6	1.2
	Total					
	Mean	88.1	1.2	59.7	17.7	3.0
	S.D.	15.5	1.2	9.5	6.9	1.2
Mexican-American	Male					
	Mean	87.1	1.4	57.5	18.3	2.9
	S.D.	16.6	1.3	8.5	4.4	1.0
	Female					
	Mean	87.4	1.2	53.9	17.1	2.5
	S.D.	15.4	1.2	9.2	4.7	1.3
	Total					
	Mean	87.2	1.3	55.7	17.7	2.7
	S.D.	15.7	1.2	8.9	4.5	1.2

A series of t-tests, the results of which are presented in Table 3, indicates that the Mexican-American and Anglo-American groups did not differ significantly in performance on either the classification or transitivity tasks.

TABLE 3

t-Values for Differences Between Ethnic Groups With Regard to Predictor and Criterion

Comparison Group	df	Age	Grade	Verbal Ability	Classification	Transitivity
Anglo-Americans and Mexican-Americans	58	.224	.328	1.680	.0	.983

In order to determine any meaningful relationships between the predictor and criterion variables, the data were subjected to two statistical procedures: (1) Pearson-product moment correlation, and (2) multiple linear regression. A multiple regression procedure seemed appropriate, in view of the complex nature of cognitive development. It was felt that many variables might influence the development of classification and transitivity skills, and multiple regression methods have the capability of dealing with such complex interrelations between several independent variables and a dependent variable. Table 4 presents the means and standard deviations obtained for each of the five predictor variables together with the criterion variables of classification and transitivity task performance.

TABLE 4

Means and Standard Deviations of Predictor and Criterion Variables

Variables	Mean	Standard Deviation
1. Chronological Age (in months)	87.67	15.34
2. Grade	1.25	1.18
3. Sex	.50	.50
4. Ethnic Background	.50	.50
5. Verbal Ability (PPVT raw score)	57.70	8.82
41. Classification - composite raw score	17.70	5.76
45. Transitivity - composite raw score	2.83	1.17

Correlational Data

A correlation matrix was formed from the scores on the five predictor variables, the composite score of the eight classification tasks, and the composite score of the three transitivity tasks. The resulting correlation coefficients are presented in Table 5. Of the five predictor variables used in this study, only

TABLE 5

Correlation Matrix

Variables	1	2	3	4	5	41	45
1. Age	1.00						
2. Grade	.95**	1.00					
3. Sex	.04	.10	1.00				
4. Ethnic Background	-.03	.04	.0	1.00			
5. Verbal Ability	.57**	.52**	.26	-.22	1.00		
41. Classification	.39**	.41**	.16	.01	.48**	1.00	
45. Transitivity	.25	1.8	.17	-.11	.35*	.09	1.00

*p < .05

**p < .01

three were found to correlate significantly with any of the criteria: (a) chronological age correlated significantly ($r = .39$, $df = 58$, $p. < .01$) with classification, (b) grade level correlated significantly ($r = .41$, $df = 58$, $p. < .01$) with classification, and (c) verbal ability correlated significantly ($r = .48$, $df = 58$, $p. < .01$) with classification and with transitivity ($r = .35$, $df = 58$, $p. < .05$). The predictors of sex and ethnic background were not found to be significantly correlated with either of the criterion variables.

Regression Analysis

Multiple linear regression models were used to determine if the multiple correlation (R^2) for all of the independent variables combined (full model) was significant and if the specific contributions of each of the independent variables to the prediction of a specific dependent variable (criterion) was significant. In using the multiple linear regression model for this study, five predictor variables and the criteria variables of classification and transitivity, with their component tasks were used. For each of the criterion variables, a full model (FM) gave a total contribution proportion (R^2s). This R^2 value was then tested to indicate its statistical significance.

The results of the regression analysis using the classification composite score and the transitivity composite score as criteria are summarized in Table 6. The data in Table 6 indicate that the multiple R value for the full model based on classification had a total contribution proportion equal to .2805. This R^2 was significant at the .01 level and indicates the five predictor variables, taken together, accounted for .2805 of the total criterion variance. That is, approximately 28 percent of the variance was accounted for when the five variables were used as predictors. Table 6 also indicates that the R^2 for the restricted model omitting verbal ability was significant at the .01 level. This means that the single predictor variable, verbal ability, accounted for .0963 of the total

TABLE 6

Proportion of Variance Attributable to the Variables of Age(1), Grade(2), Sex(3), Ethnic Background(4), and Verbal Ability(5)

Predictor Variable Group	R^2	df	F
Full Model (1,2.3.4.5) with Classification as criterion	.2805	5, 54	4.210*
Restricted Model (2,3,4,5)	.2749	1, 54	.418
Restricted Model (1,3,4,5)	.2635	1, 54	1.275
Restricted Model (1,2,4,5)	.2801	1, 54	.031
Restricted Model (1,2,3,5)	.2758	1, 54	.353
Restricted Model (1,2,3,4)	.1842	1, 54	7.225*
Full Model (1,2,3,4,5) with Transitivity as criterion	.1722	5, 54	2.245
Restricted Model (2,3,4,5)	.1300	1, 54	2.750
Restricted Model (1,3,4,5)	.1359	1, 54	2.368
Restricted Model (1,2,4,5)	.1542	1, 54	1.170
Restricted Model (1,2,3,5)	.1720	1, 54	.009
Restricted Model (1,2,3,4,)	.1391	1, 54	2.155

(p < .01

criterion variance or almost one-tenth of the total classification variance. No other single predictor variable was found to be a significant predictor of classification performance.

The multiple R value for the full model system using the transitivity composite score as the criterion was not found to be significant at the .05 level. The five predictor variables used in the present study accounted for only 17.22 percent of the total criterion variance.

In summary, the five predictor variables used in this study were successful in predicting the composite classification score. However, the predictor variables, both as a group and singly, were not effective in predicting performance on transitivity tasks. The predictor variables of ethnic background, age, grade, and sex were not found to be effective predictors of classification task performance when taken in isolation. Instead, the single best predictor of classification performance was found to be verbal ability.

A number of t-tests were conducted comparing the low SES group with the middle SES group, the results of which are presented in Table 7.

TABLE 7

Means, Standard Deviations and t-Values for Differences Between SES Groups on Measures of Classification and Seriation. (DF = 118, N = 60)

	Classification		Transitivity	
Group	Mean	SD	Mean	SD
Middle SES	23.08	6.49	7.95	5.24
Low SES	17.70	5.85	2.83	1.18
	t = 4.77*		t = 7.38*	

(p.= < .001)

The data in Table 6 clearly shows that the middle SES children, while being younger, still out performed the low SES children on these measures. Further comparison of the judgment responses and verbal explanations produced identical results. Each of these criterion resulted in middle SES scores being significantly higher on both the classification and transitivity measures. The t-ratios for these comparisons ranged between 3.31 and 7.42 with all differences remaining significant beyond the .001 level.

Discussion

An examination of the correlation matrix (Table 5) indicates that the predictor variable of ethnic background showed no significant correlation with the performance criterion. The lack of any significant correlation between ethnic background and either criterion indicates that any differences that exist between the Anglo-American and Mexican-American cultures represented in the present sample population, are not of a nature or degree to adversely affect performance on the measured cognitive tasks.

The present sample was considered by school officials to be relatively homogenous in regard to their lower-middle class economic background. This fact could account for the general findings concerning the abilities of Mexican-American students. Swize (1971) did, in fact, find that middle-class Anglo-American subjects performed better on conservation tasks than did lower-class Mexican-American subjects. The comparison in the second portion of the study supports the contention that socio-economic factors are influential in the development of certain cognitive abilities. The apparent reported lack of educational achievement by some Mexican-American students may then be at least partially explained by the higher proportion of Mexican-American students who come from lower SES families. That is, the observed differences in cognitive functioning

between Anglo-Americans and Mexican-Americans may be based on economic, and not ethnic, factors. The results of the present study support this interpretation. Further research should be conducted to determine the full ramification of these differences as they relate to school performance. Also, more information is needed to determine the relative influences of variables which may correlate with both SES level and performance on Piagetian Tasks. Such variables would include verbal abilities, early education and stimulation, measured intelligence and educational conditions.

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